

# PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2004-308137

(43)Date of publication of application : 04.11.2004

(51)Int.Cl. E02F 9/26  
B60K 35/00  
G01D 7/00

(21)Application number : 2003-099485 (71)Applicant : SHIN CATERPILLAR MITSUBISHI LTD

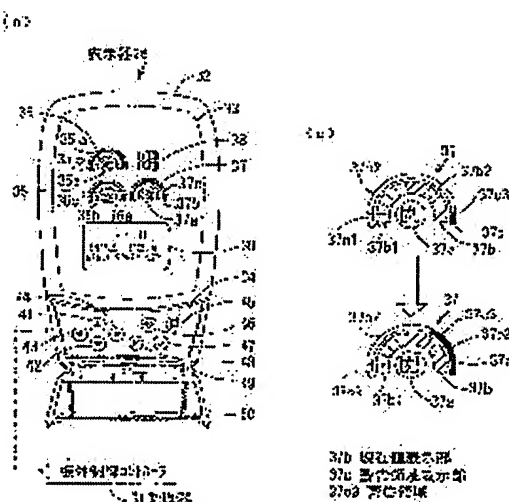
(22)Date of filing : 02.04.2003 (72)Inventor : YAMADA HIDEO  
FUJII SATOSHI  
MUROTA ISAO

## (54) DISPLAY DEVICE AND DISPLAY CONTROL DEVICE

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide a display device for coping with a change in a warning area, and a display control device for easily variably controlling the warning area.

**SOLUTION:** The display device 28 has a present value display part 37b for displaying a present measured value, and a warning area display part 37c arranged along the present value display part 37b. This warning area display part 37c displays whether or not the present measured value exists in at least a red zone 37c3, and can vary a range of the red zone 37c3. The display control device has a machine body control controller 31 for indicating a change in the range of the red zone 37c3 of the warning area display part 37c to the display device 28 on the basis of registered data corresponding to a selected choice by selecting one from a plurality of choices displayed on this display device 28.



\* NOTICES \*

JPO and INPIT are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.\*\*\*\* shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

---

CLAIMS

---

[Claim(s)]

[Claim 1]

A present value indicator which displays the present measurement value,  
A warning area indicator which made the range of a warning area variable while indicating whether it is provided along with a present value indicator, and the present measurement value is in a warning area at least  
A providing display for indication.

[Claim 2]

A warning area indicator was displayed with a liquid crystal.  
The display for indication according to claim 1 characterized by things.

[Claim 3]

The display for indication according to claim 1 or 2,  
A controller which directs change of the range of a warning area of a warning area indicator to a display for indication based on a choice selected by choosing one from two or more choices displayed on a display for indication, and corresponding existing registration data  
A providing display control.

[Claim 4]

A display for indication and a controller are carried in a hydraulic excavator,  
A choice is a kind of tool with which a hydraulic excavator was equipped exchangeable,  
A measurement value is the operation oil temperature of a hydraulic excavator.  
The display control according to claim 3 characterized by things.

---

[Translation done.]

\* NOTICES \*

JPO and INPIT are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.\*\*\*\* shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

---

DETAILED DESCRIPTION

---

[Detailed Description of the Invention]

[0001]

[Field of the Invention]

This invention relates to the display control which carries out variable control of the display for indication which displays a warning area, and its warning area.

[0002]

[Description of the Prior Art]

In the display for indication of construction machinery, such as a hydraulic excavator, the gauge which displays remaining fuel, cooling water temperature, operation oil temperature, etc. comprises a needle or a liquid crystal segment etc. which indicates the present measurement value to be the printed stationary type Japanese peak (for example, refer to patent documents 1).

[0003]

Since staining etc. are carried out to a graduation and he was trying to know a warning area, like water temperature or an oil temperature with little remaining fuel is high, the worker can recognize that the present measurement value has arrived at the warning area.

[0004]

[Patent documents 1]

JP,2002-339408,A (the two - 3rd page, drawing 1, 9)

[0005]

[Problem(s) to be Solved by the Invention]

However, warning areas, such as operation oil temperature, change with work tools, When it changes for other work tools (for example, breaker) from the usual work tool (for example, bucket), it is desirable to change the warning area of operation oil temperature, but it cannot respond to change of a warning area and danger cannot be made to recognize suitable for a worker in the printed graduation of the conventional stationary type.

[0006]

This invention was made in view of such a point, and an object of this invention is to provide the display control which can carry out variable control of the display for indication which can respond to change of a warning area, and its warning area easily.

[0007]

[Means for Solving the Problem]

A present value indicator as which an invention indicated to claim 1 displays the present measurement value, it being a display for indication possessing a warning area indicator which made the range of a warning area variable, while indicating whether it is provided along with a present value indicator, and the present measurement value is in a warning area at least, and, Since the range of a warning area of a warning area indicator provided along with a present value indicator was made variable, even if it is a case where a warning area is changed, it can be made to recognize suitable for those who find whether it is in the state where the present measurement value should warn.

[0008]

A warning area indicator in the display for indication according to claim 1 is the display for indication displayed with a liquid crystal, and by displaying a warning area indicator with a liquid crystal, the invention indicated to claim 2 can change the range of a warning area easily, and can meet the broad user needs.

[0009]

An invention indicated to claim 3 The display for indication according to claim 1 or 2, It is a display control possessing a controller which directs change of the range of a warning area of a warning area indicator to a display for indication based on a choice selected by choosing one from two or more choices displayed on a display for indication, and corresponding existing registration data, And since the range of a warning area of a warning area indicator is automatically changed based on existing registration data in which a controller corresponds with the selected choice only by choosing one from two or more choices displayed on a display for indication, the variable control of the range of a warning area can be carried out easily and appropriately.

[0010]

A display for indication and a controller in the display control according to claim 3 an invention indicated to claim 4, it being carried in a hydraulic excavator and considered as a kind of tool equipped with a choice by hydraulic excavator exchangeable, and it being the display control made into operation oil temperature of a hydraulic excavator, and a measurement value, It is only choosing one from two or more tools displayed on a display for indication, when a tool of a hydraulic excavator is exchanged, Since a controller changes automatically the range of a warning area of operation oil temperature based on the selected tool and corresponding existing registration data, the operator of a hydraulic excavator can supervise operation oil temperature, comparing with a warning area appropriately set up automatically according to a tool.

[0011]

[Embodiment of the Invention]

It explains in detail, referring to the 1 embodiment shown in drawing 1 thru/or drawing 6 in this invention hereafter.

[0012]

Drawing 5 shows the hydraulic excavator as an operating machine, and is provided in the base carrier 11 so that revolution of the revolving super-structure 12 is possible, Besides, the driving space of the power plant parts 13, such as a hydraulic pump driven with an engine and this engine to the part revolving superstructure 12, the control-valve unit (not shown) which controls the hydraulic circuit which makes a hydraulic pump a hydraulic power unit, and an operator is carried in the wrap cab 14, the work device 15, etc.

[0013]

The work device 15 to the tip part of the boom 17 rotated by the oil hydraulic cylinder 16 for booms. The arm 19 rotated by the oil hydraulic cylinder 18 for arms is supported pivotally, and the bucket 23 rotated via the linkage 22 by the oil hydraulic cylinder 21 for buckets to the tip part of this arm 19 is supported pivotally.

[0014]

Drawing 6 shows the inside of said cab 14, and the control lever 25 for a run is formed ahead [ of the seat 24 ], The control levers 26L and 26R of operating as an operation unit are formed in both sides of the seat 24, The lever top switch 27 called a one-touch low idle switch or an OTODE cell key etc. from which engine revolving speed is reduced to one-touch control to the set-up low speed state is formed in the upper part of the control lever 26R by the side of the one.

[0015]

The display for indication 28 which also has an inputting function is arranged at the 1 side of the control lever 25 for a run. The oil pressure locking lever 29 for stopping a hydraulic circuit is arranged at the hatchway side of the seat 24.

[0016]

Next, other embodiments are described, respectively, referring to drawing 4, referring to drawing 1 thru/or drawing 3 for the 1 embodiment of a display for indication and a display control

concerning this invention.

[0017]

Drawing 1 (a) shows the display for indication 28 installed in the cab 14 of the hydraulic excavator as said operating machine, and the body controller 31 as a controller is connected to this display for indication 28.

[0018]

Although this body controller 31 is provided with a central processing unit (CPU) and memories (ROM, RAM, etc.) and the running motion of the base carrier 11 of a hydraulic excavator, the turning operation of the revolving super-structure 12, work operation of the work device 15, etc. are controlled, Transfer of information required for operation of the display for indication 28 is also performed.

[0019]

The display for indication 28 is formed in the indicator body 32 by the display panel part 33 and the operation panel part 34, and the display panel part 33, The fuel gauge 35 which displays the residue of engine fuel, and the water thermometer 36 which displays the water temperature of engine cooling water, The oil temperature gauge 37 which displays the oil temperature of the hydraulic oil of a hydraulic circuit, and the character displaying parts 38, such as a numerical value, The message indicator part 39 which functions as a display of the body controller 31, etc. is the liquid crystal display provided, respectively, and especially the fuel gauge 35, the water thermometer 36, and the oil temperature gauge 37 are the FURUGURAFIKKU screen which used a full graphic liquid crystal / LED (light emitting diode).

[0020]

On the other hand, the up arrow key 41, the down arrow key 42, the left arrow key 43, the right arrow key 44, the menu screen key 45, the set key 46, OK key 47, and the cancel key 48 as a key input means are provided in the operation panel part 34 of the display for indication 28.

[0021]

In the lower end part of the indicator body 32, the cover body 50 is formed by the hinge region 49, enabling free opening and closing, and the operation panel part 34 is protected by this cover body 50.

[0022]

Said fuel gauge 35, the water thermometer 36, and the oil temperature gauge 37 are provided with the following.

Respectively, they are the symbol icons 35a, 36a, and 37a.

The present value indicators 35b, 36b, and 37b which display the present measurement value (remaining fuel, water temperature, oil temperature) arranged so that these symbol icons 35a, 36a, and 37a may be surrounded.

The warning area indicators 35c, 36c, and 37c provided outside along with these present value indicators 35b, 36b, and 37b.

[0023]

Although the symbol icons 35a, 36a, and 37a are the marks of a fixed form, the present value indicators 35b, 36b, and 37b arrange two or more liquid crystal segments circularly, and they are made to indicate a number equivalent to the present measurement value (remaining fuel, water temperature, oil temperature) of the liquid crystal segments by staining.

[0024]

For example, as shown in drawing 1 (b), classification-by-color formation of the present value indicator 37b of the oil temperature gauge 37 is carried out by two or more liquid crystal segments by which the field 37b1 which carries out the scale display of the present oil temperature, and the field 37b2 which is not so can change staining.

[0025]

It indicates whether each warning area indicators 35c, 36c, and 37c have the present measurement value in a warning area at least, and these warning area indicators 35c, 36c, and 37c are also arranging two or more liquid crystal segments circularly, and make the range of a warning area variable.

[0026]

For example, as shown in drawing 1 (b), the warning area indicator 37c of the oil temperature gauge 37, The low temperature region 37c1 for the necessity for warming up to be shown in an operator since the oil temperature is too low, Since the appropriate temperature field 37c2 which shows that an oil temperature is in an appropriate range, and the oil temperature are too high, classification-by-color formation of the red zone 37c3 as a warning area of a \*\* sake is carried out in cautions by two or more liquid crystal segments by which \*\* can change staining (for example, white, green, red, etc.) at the operator.

[0027]

By for this reason, the thing for which staining of the liquid crystal segment which suited the appropriate temperature field 37c2 side is changed into the warning area side, for example in the boundary part of the appropriate temperature field 37c2 and the red zone 37c3. For example, by changing into red from green, as shown in drawing 1 (b), the red zone 37c3 is expandable to the low temperature side.

[0028]

Classification-by-color formation of the red zone as a warning area is similarly carried out by two or more liquid crystal segments which can change staining at the fuel gauge 35 and the water thermometer 36.

[0029]

When said body controller 31 chooses one from two or more choices displayed on the message indicator part 39 of the display for indication 28, It has the function to direct change of the range of the red zone 37c3 of the warning area indicators 35c, 36c, and 37c, for example, a red zone, to the display for indication 28 based on the selected choice and corresponding existing registration data.

[0030]

A choice is a kind of tools, such as the bucket 23, a breaker (not shown), etc. with which the hydraulic excavator was equipped exchangeable.

[0031]

Next, in the warning area indicator 37c of the oil temperature gauge 37 which measures the operation oil temperature of the hydraulic circuit carried in the hydraulic excavator while referring to the flow chart shown in drawing 2 and drawing 3, The body controller 31 explains the control procedure which changes the range of the red zone 37c3 as shown in drawing 1 (b). The circled number shown in the figure shows a step number.

[0032]

(Step 1)

The usual screen is displayed on the message indicator part 39 of the display for indication 28.

[0033]

(Step 2)

The operator of a hydraulic excavator presses the menu screen key 45 provided in the operation panel part 34 of the display for indication 28.

[0034]

(Step 3)

If a menu screen starts, the down arrow key 42 will be operated and cursor will be moved to a "selection tool."

[0035]

(Step 4)

A push on OK key 47 will display the tool name chosen now, for example, the tool name meaning the bucket 23.

[0036]

(Step 5)

If OK key 47 is again pressed on the present selection tool screen, it will switch to a password demand screen.

[0037]

(Step 6)

The up arrow key 41, the down arrow key 42, the left arrow key 43, and the right arrow key 44 are operated, and the user password set up beforehand is entered.

[0038]

(Step 7)

The left arrow key 43 and the right arrow key 44 are operated, and a tool name, for example, the tool name meaning a breaker, to change and choose is displayed out of two or more tool names registered beforehand.

[0039]

(Step 8)

If a target tool name is displayed, the set key 46 will be pressed.

[0040]

(Step 8-1)

If the set key 46 is pressed, the display for indication 28 will transmit that the tool was changed to the body controller 31.

[0041]

(Step 8-2)

It transmits that the body controller 31 changed the control parameter in engine-speed control, hydraulic-pump-capacity variable control, etc. into the control parameter doubled with the tool, and change completed it to the display for indication 28.

[0042]

(Step 8-3)

Simultaneously, the body controller 31 transmits the operating temperature limit of the selected tool to the display for indication 28.

[0043]

(Step 8-4)

Based on the data of the operating temperature limit received from the body controller 31, the display for indication 28 changes the range of the red zone 37c3 of the warning area indicator 37c, as shown in drawing 1 (b).

[0044]

(Step 8-5)

The screen which tells a tool setting variation is displayed.

[0045]

(Step 9)

If the completion of setting out is carried out, a new tool name will be displayed and it will return to a normal screen automatically.

[0046]

As mentioned above, since the range of warning areas, such as the red zone 37c3 of the warning area indicators 35c, 36c, and 37c provided along with the present value indicators 35b, 36b, and 37b, was made variable, Even if it is a case where a warning area is changed, it can be made to recognize suitable for those who find whether it is in the state where the present measurement value should warn.

[0047]

By displaying the warning area indicators 35c, 36c, and 37c with a liquid crystal, the range of warning areas, such as the red zone 37c3, can be changed easily, and the broad user needs can be met.

[0048]

Only by choosing one from two or more choices displayed on the display for indication 28. Since the body controller 31 changes automatically the range of warning areas, such as the red zone 37c3 of the warning area indicators 35c, 36c, and 37c, based on the selected choice and corresponding existing registration data, the variable control of the range of a warning area can be carried out easily and appropriately.

[0049]

For example, when tools, such as the bucket 23 of a hydraulic excavator, are exchanged for other tools, for example, a breaker etc., Only by choosing one from two or more tools displayed

on the display for indication 28. Since the body controller 31 changes automatically the range of the red zone 37c3 of operation oil temperature based on the selected tool and corresponding existing registration data, The operator of a hydraulic excavator can supervise operation oil temperature, comparing with the red zone 37c3 appropriately set up automatically according to the tool.

[0050]

When using the bucket 23 as a tool, the minimum of the red zone 37c3 of operation oil temperature is specifically set as 100 \*\*, and when using a breaker as a tool, the minimum of the red zone 37c3 of operation oil temperature is set as low temperature from 100 \*\*.

[0051]

Next, drawing 4 shows the display panel part 33a which displayed said fuel gauge 35, the water thermometer 36, and the oil temperature gauge 37 in the shape of a bar graph, The warning area indicators 35c, 36c, and 37c are arranged to linear shape in the adjoining position of the symbol icons 35a, 36a, and 37a, Along with these warning area indicators 35c, 36c, and 37c, the present value indicators 35b, 36b, and 37b which display the present measurement value (remaining fuel, water temperature, oil temperature) are arranged to linear shape.

[0052]

Although the symbol icons 35a, 36a, and 37a are the marks of a fixed form, the present value indicators 35b, 36b, and 37b arrange two or more liquid crystal segments to linear shape, and they are made to indicate a number equivalent to the present measurement value (remaining fuel, water temperature, oil temperature) of the liquid crystal segments by staining.

[0053]

It indicates whether each warning area indicators 35c, 36c, and 37c have the present measurement value in a warning area at least, and these warning area indicators 35c, 36c, and 37c are also arranging two or more liquid crystal segments to linear shape, and make the range of a warning area variable.

[0054]

For example, the warning area indicator 37c of the oil temperature gauge 37, The low temperature region 37c1 for the necessity for warming up to be shown in an operator since the oil temperature is too low, Since the appropriate temperature field 37c2 which shows that an oil temperature is in an appropriate range, and the oil temperature are too high, classification-by-color formation of the red zone 37c3 as a warning area of a \*\* sake is carried out in cautions by two or more liquid crystal segments by which \*\* can change staining (for example, white, green, red, etc.) at the operator.

[0055]

By for this reason, the thing for which staining of the liquid crystal segment which suited the appropriate temperature field 37c2 side is changed into the warning area side, for example in the boundary part of the appropriate temperature field 37c2 and the red zone 37c3. For example, by changing into red from green, as shown in drawing 4, the red zone 37c3 is expandable to the low temperature side.

[0056]

not only with the oil temperature gauge 37 but with the fuel gauge 35 and the water thermometer 36, change of such a range of a warning area is possible similarly, for example, was provided in the bottom of the warning area indicator 35c of the fuel gauge 35 -- "it is possible to also make the range of the white part which shows remaining fuel few" expand upwards.

[0057]

Although the illustrated embodiment displays the gauge in a display for indication of a hydraulic excavator with a full graphic liquid crystal, the present value indicators 35b, 36b, and 37b are not limited to a liquid crystal segment, and may be mechanically made into a movable indicator.

[0058]

[Effect of the Invention]

Since the range of the warning area of a warning area indicator provided along with the present value indicator was made variable according to the invention according to claim 1, even if it is a



case where a warning area is changed, it can be made to recognize suitable for those who find whether it is in the state where the present measurement value should warn.

[0059]

According to the invention according to claim 2, by displaying a warning area indicator with a liquid crystal, the range of a warning area can be changed easily and the broad user needs can be met.

[0060]

Only by choosing one from two or more choices displayed on the display for indication according to the invention according to claim 3. Since a controller changes automatically the range of the warning area of a warning area indicator based on the selected choice and corresponding existing registration data, the variable control of the range of a warning area can be carried out easily and appropriately.

[0061]

When the tool of a hydraulic excavator is exchanged according to the invention according to claim 4, Since the range of the warning area of operation oil temperature is automatically changed based on the existing registration data in which a controller corresponds with the selected tool only by choosing one from two or more tools displayed on the display for indication, The operator of a hydraulic excavator can supervise operation oil temperature, comparing with the warning area appropriately set up automatically according to the tool.

[Brief Description of the Drawings]

[Drawing 1] The front view showing the 1 embodiment of a display for indication and a display control which (a) requires for this invention, and (b) are the explanatory views showing the example of range change of the warning area in the warning area indicator of the fuel level indicator.

[Drawing 2] It is a flow chart which shows an example of the control procedure by a display control same as the above.

[Drawing 3] It is a flow chart which shows the control procedure between Step 8 and Step 9 in a flow chart same as the above.

[Drawing 4] It is a front view showing other embodiments of the display for indication concerning this invention.

[Drawing 5] It is a side view of the hydraulic excavator relevant to this invention.

[Drawing 6] It is a perspective view showing the composition in a cab of a hydraulic excavator same as the above.

[Description of Notations]

28 Display for indication

31 The body controller as a controller

37b Present value indicator

37c Warning area indicator

37c3 Red zone as a warning area

---

[Translation done.]

## \* NOTICES \*

JPO and INPIT are not responsible for any damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.

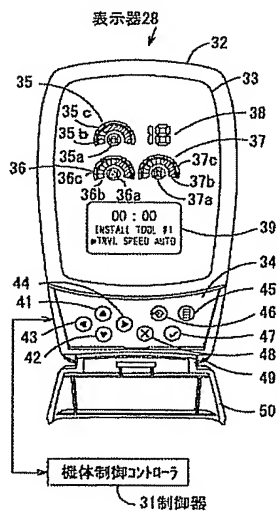
2.\*\*\* shows the word which can not be translated.

3.In the drawings, any words are not translated.

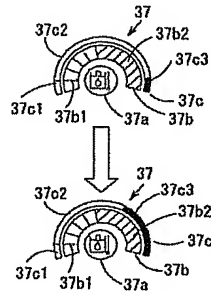
## DRAWINGS

[Drawing 1]

(a)

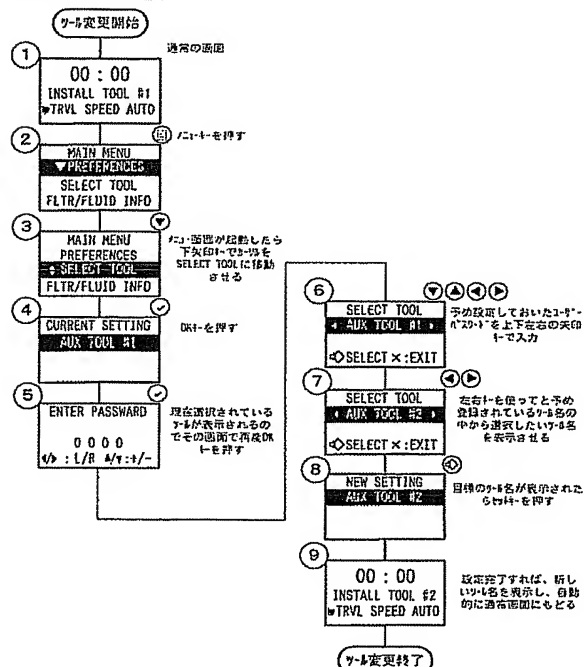


(b)

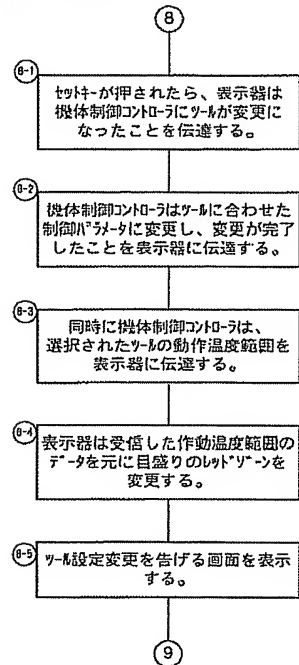


37b 現在値表示部  
37c 警告領域表示部  
37c3 警告領域

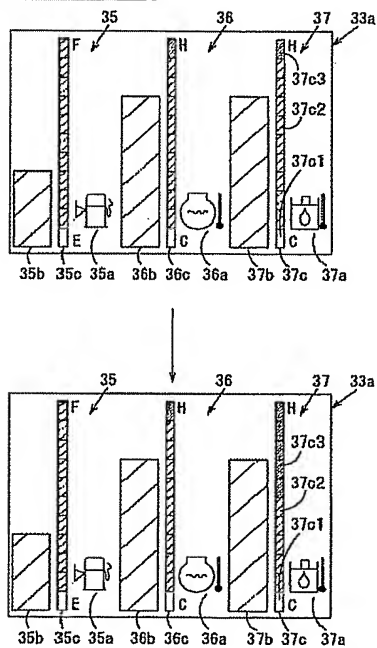
[Drawing 2]



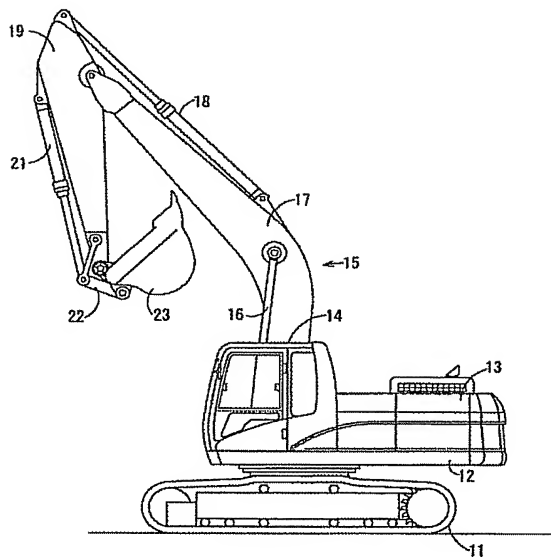
[Drawing 3]



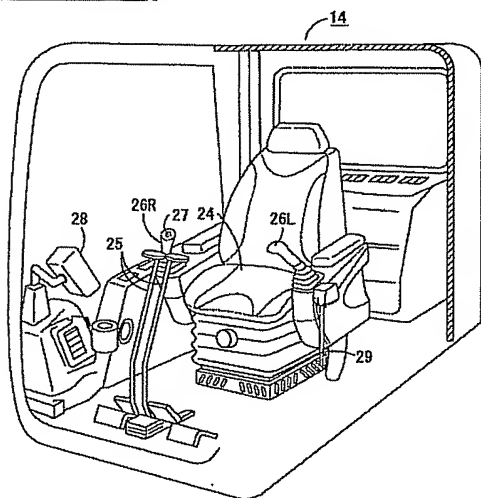
[Drawing 4]



[Drawing 5]



[Drawing 6]



---

[Translation done.]

**\* NOTICES \***

JPO and INPIT are not responsible for any damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.\*\*\* shows the word which can not be translated.

3.In the drawings, any words are not translated.

---

**DESCRIPTION OF DRAWINGS**

---

[Brief Description of the Drawings]

[Drawing 1]The front view showing the 1 embodiment of a display for indication and a display control which (a) requires for this invention, and (b) are the explanatory views showing the example of range change of the warning area in the warning area indicator of the fuel level indicator.

[Drawing 2]It is a flow chart which shows an example of the control procedure by a display control same as the above.

[Drawing 3]It is a flow chart which shows the control procedure between Step 8 and Step 9 in a flow chart same as the above.

[Drawing 4]It is a front view showing other embodiments of the display for indication concerning this invention.

[Drawing 5]It is a side view of the hydraulic excavator relevant to this invention.

[Drawing 6]It is a perspective view showing the composition in a cab of a hydraulic excavator same as the above.

[Description of Notations]

28 Display for indication

31 The body controller as a controller

37b Present value indicator

37c Warning area indicator

37c3 Red zone as a warning area

---

[Translation done.]